The Hotson and Chapin Mf'g. Company's Boilers and Radiators For Warming and Ventilating By Hot Water.

Foundry, Machine Shops and Main Office,
New London, Conn. U. S. A.

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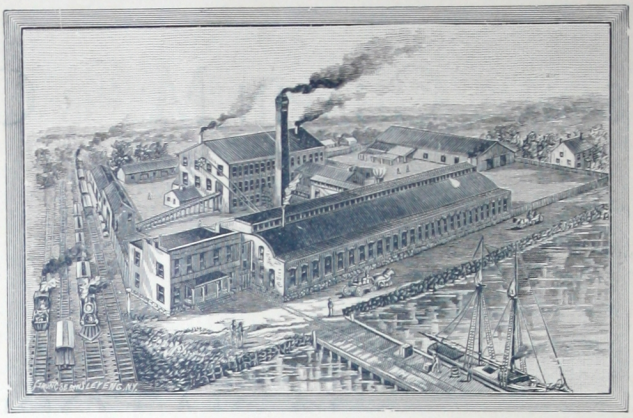
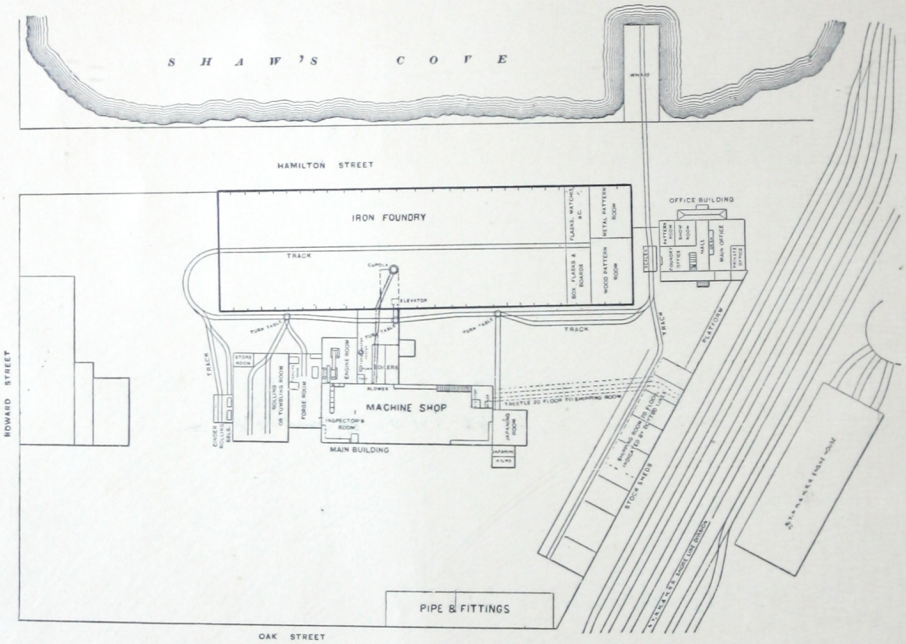
THE HOPSON & CHAPIN M'F'G CO.'S BOILERS AND RADIATORS FOR WARMING AND VENTILATING BY HOT WATER.

FOUNDRY, MACHINE SHOPS AND MAIN OFFICE,
NEW LONDON, CONN., U. S. A.

1893.

THE WILLIAMS PRINTING CO., 96-102 READE ST., N. Y.





GENERAL PLAN OF THE WORKS OF THE HOPSON & CHAPIN MFG. CO., NEW LONDON, CONN.

THE HOPSON & CHAPIN M'F'G. COMPANY'S FOUNDRY, MACHINE SHOPS AND MAIN OFFICE, HAMILTON, OAK AND HOWARD STREETS, NEW LONDON, CONN.

THE work of The Hopson & Chapin Manufacturing Company is to do warming and ventilating.

The Boilers, Radiators and Fixtures catalogued herein have been designed and are built in these works especially for warming and ventilating by hot water.

Water is an excellent vehicle to convey heat generated in a fire-box to an apartment to be warmed, and when desired to furnish the apartment also with warmed fresh air.

It is a more agreeable source of warmth than any other because it is efficient at a temperature always lower than any other—viz., at 80° to 180° as against sources of heat from steam at a minimum of 212° or from a hot-air furnace temperature of 400° to 1200° or more.

It is more economical of fuel because the cold points in all apartments being located at some distance from the fire, water, making the journey at a lower temperature than any other vehicle, will lose less heat on the way beginning with an effective temperature in the fire-box.

Desiring to do the best work, this Company selects water as a medium for the conveyance of heat, and builds boilers for the absorption of heat by water and its free circulation and radiators to part with that heat at the desired point.

An experience of several years leads to the conclusion that a useful and competent heating or heating and ventilating plant depends for its success on no single feature.

The boiler, service of connecting pipes, radiators, whether intended for heating only or for heating and ventilating, the location of the latter with respect to the principal sources of cold, the apportionment of all the parts, the plan of the whole equipment and the class of workmanship used in its erection, all form links of a chain in the construction of which one defect destroys the utility of the whole.

This Company has therefore prepared itself to furnish the entire equipment for any desired plant, designed and manufactured throughout on its own premises and from complete plans for erection made by the designers and builders.

Mr. Corliss, the famous engine builder, once said: "I want to sell power and the power plant, but I don't care to furnish a boiler for someone's engine, nor an engine for Tom, Dick and Harry's boiler." The secret of his great economy was in the designing of every part of the plant to harmoniously combine in producing the one desired result.

BOILERS.

ALL BOILERS built by this Company are of cast iron sectional type.

For the reason that the heated water leaves all boilers at the top, the sections in these boilers are vertical. This construction, in our judgment, is the most efficient for hot-water heating. It admits of the freest circulation of the water, and avoids a certain loss of heat in the form of energy necessary to overcome friction in the effort to travel horizontally for any distance, or through any tortuous passage, in boilers of the horizontal type.

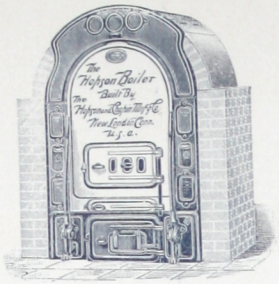
All joints (a most important feature) are screwed iron joints.

Grates are shaken from outside, and have two-thirds air space to one-third iron.

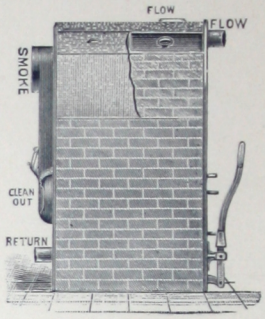
All boilers, whether set in brick or portable, have return flues 4 inches to 6 inches deep, by which the body of the boiler is heat jacketed.

Clean out doors are so placed that each part of the boiler can be readily reached for cleaning.

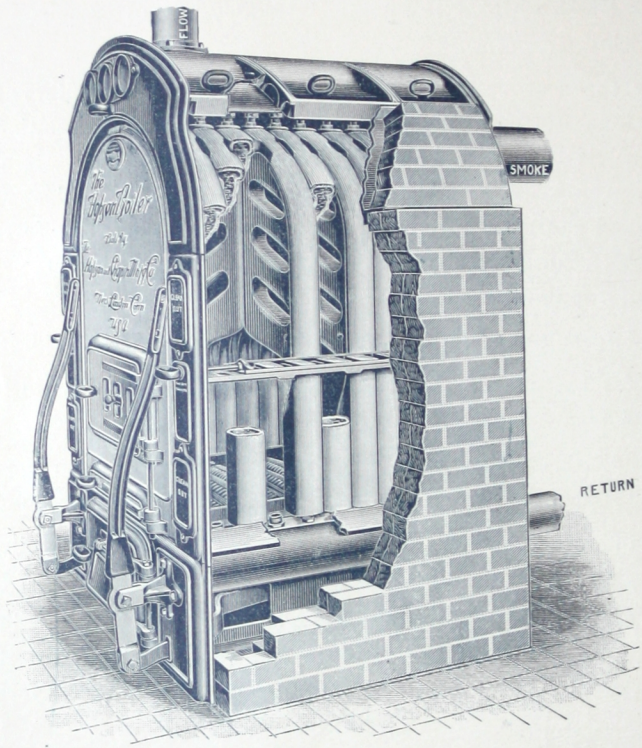
No rating of capacity of a boiler to cover all duties is possible under one head, or unless all the conditions are fully defined, but the tables given may serve to indicate an average capacity under average conditions.



Front.



Side and Rear.



Horizontal Section.

THE HOPSON BOILERS.

Vertical Section.

THE HOPSON BOILER is intended for medium to large plants, is a surface burner, has water front and back and self-contained base on which it is erected. Brick or portable sides are laid up after the boiler is set.

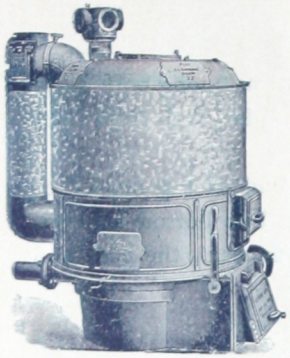
Clean-out plates are provided in front, rear and along both sides near the top, by which every square inch of the boiler, both inside and out, is not only accessible, but in plain sight.

Flow connections will be tapped in front end of top header or flanged on top. Return connections are flanged on bottom headers, rear end. Top header and flue plates, and, when used, the cast iron sides, are to be covered with asbestos mortar.

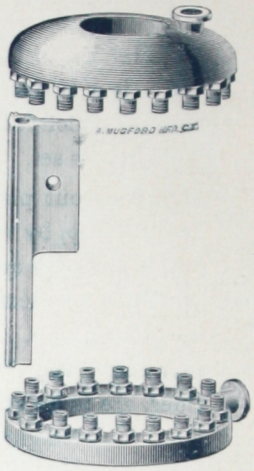
Height over all.....6 feet.
Height to face of flow flange.....6 feet.
Height to center top header flow....68½ inches.
Width, portable.....47 inches.
Width, brick-set.....60 inches.

DIMENSIONS AND LIST.

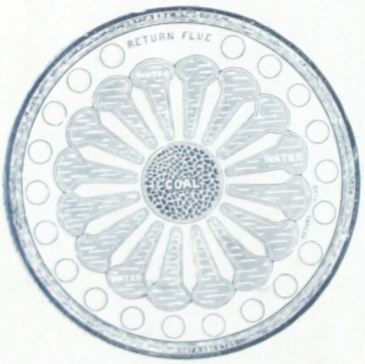
Number (and Number of Sections).	Heating Surface on which Fire Shines (sq. feet).	Total Heating Surface (sq. feet).	Average Radiation Supplied (sq. feet).	Grate Surface (sq. feet).	Contents (gallons).	Length (inches).	Smoke Pipe.	Bricks required to set.	Price, Brick Set.	Price, Cast Iron Jacket.
8	92	135	1100	4	57	34	8	350	$300.00	$308.00
9	104	152	1250	4⅔	61	38	8	400	330.00	338.00
10	117	169	1400	5⅓	66	42	8	450	360.00	370.00
11	129	186	1550	6	71	46	10	500	390.00	400.00
12	142	203	1800	6⅔	75	50	10	550	420.00	432.00
13	154	220	2000	7⅓	80	54	10	600	460.00	472.00
14	166	236	2200	8	85	58	12	600	500.00	514.00
15	179	253	2400	8⅔	89	62	12	650	550.00	564.00
16	192	280	2600	9⅓	94	66	12	700	600.00	616.00



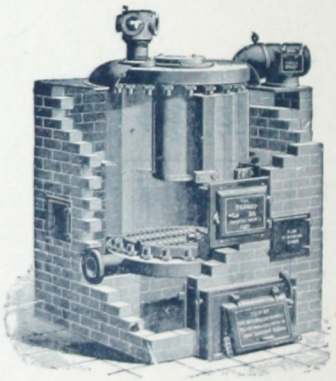
Double Sheet Iron Jacket.
Abestos Filled.



Top, Bottom and one Upright
Section.



Horizontal Section of Boiler Above Fire
Box, showing Heating Surface.



Set in Brick.

THE PEQUOT BOILERS.

THE PEQUOT BOILER is a magazine-feed boiler, and is intended for small to medium size plants.

Nos. 18, 22 and 26 are made portable.

Nos. 26 and 30 are made for brick setting.

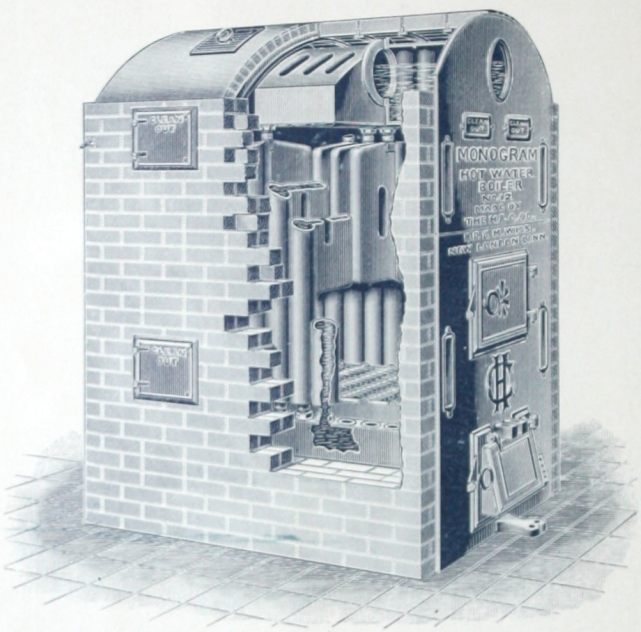
The 1 inch space between double galvanized casings (portable) is to be filled with dry asbestos or mineral wool.

A magazine feed is a very considerable advantage in this size boiler, reducing attention required and giving uniformity of sustained temperature in most cold days, and all cold nights.

DIMENSIONS AND LIST.

Number and Grate Diameter.	Square Feet Heating Surface.	Outside Dimensions.		Height.	Contents in Gallons.	Flow and Return Connections.	Average Square Feet Radiation Supplied.	PRICE.	
		Diameter Portable.	Brick Setting.					Portable.	Brick Set.
18	60	33	.....	50	25	3 inches	400	$140.00	.....
22	90	39	.....	57	36	3½ "	600	200.00	.....
26	115	44	48 x 49	62	50	4 "	800	267.00	$220.00
30	140	..	53 x 54	64	60	4½ "	1,100	.....	320.00

Double Galvanized Iron Casings supplied with Portable Boilers.



THE MONOGRAM BOILER.

THE MONOGRAM BOILER is a surface burner; is set in brick and is designed for the largest work.

The boiler is erected on a brick foundation and inclosed in brick on sides, rear and top, and has an iron front.

General construction conforms to description of boilers, page 3.

Height over all, 7 feet.

Height to center flow connections, 6 feet 1 inch.

Height to center return connections, 15 inches.

Width, 5 feet 2 inches.

DIMENSIONS AND LIST.

Number (and number of sections).	Heating Surface (Sq. Feet).	Average Radiation Supplied (Sq. Feet).	Grate Surface (Sq. Feet).	Contents in Gallons.	Length. Inches.	Smoke Pipe.	Bricks Required to Set.	Price.
12	288	2300	8.3	150	60	12	2000	$525.00
14	336	2700	10.4	180	68	12	2500	600.00
16	384	3100	12.5	210	76	12	3000	675.00
18	432	3500	14.6	240	84	14	3500	750.00
20	480	4000	16.7	270	92	14	4000	825.00
22	528	4500	18.8	300	100	14	4500	900.00

RADIATORS.

DIRECT RADIATORS.

THE WORK of a radiator is to emit the heat brought to it. This is accomplished in direct radiators by two processes—viz., by radiation, and by contact of air.

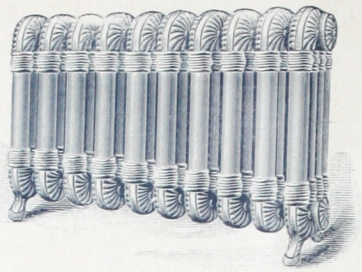
When the surfaces of a radiator are exposed so as to radiate heat directly, the quantity lost to the room by such radiation is about the same as that lost by contact of air from the same surfaces.

The face, top and ends of a radiator—usually about one quarter of its entire surface—are exposed for radiation, consequently about four-fifths of the work of a direct radiator is done by contact of air.

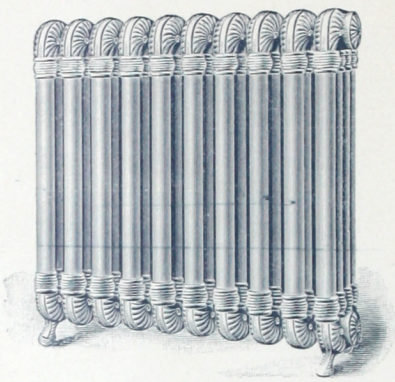
The value of heating surfaces in a direct radiator depends largely, therefore, on the freedom with which air may reach and escape from them.

The Connecticut Direct Radiator is made of cast iron and consists of four tubes joined by heads within which the water passages are on easy lines. The two inner tubes are of internal and external diameter of 1½-inch pipe, and the two outer tubes 1¼-inch pipes. These pipes are assembled with 1 inch air space between them, and permit air circulation with greatest freedom.

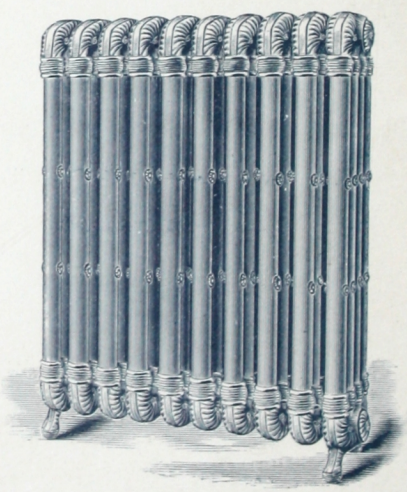
Screwed iron nipples are used to make up the joints.



21 Inches High.



30 Inches High.



38 Inches High.

THE CONNECTICUT RADIATOR.

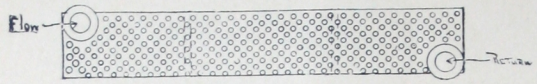
HOPSON & CHAPIN MFG CO.'S "CONNECTICUT" HOT WATER RADIATOR.

CONTENTS IN GALLONS.

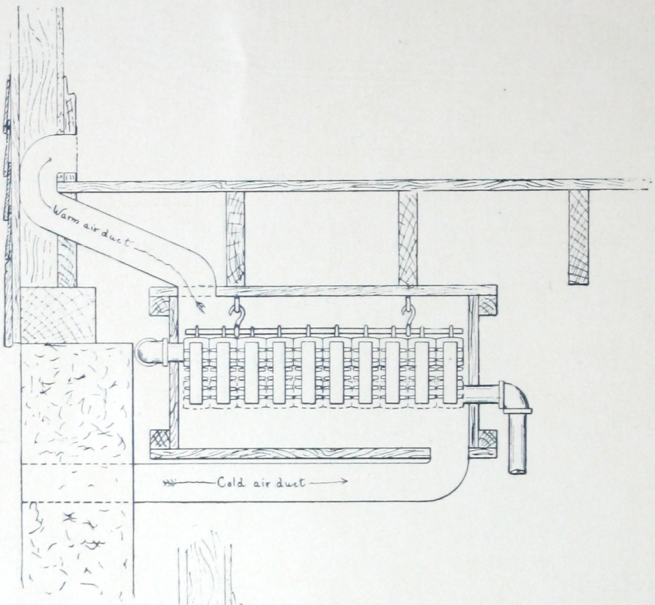
38 inches high— 1 Gallon per Section.
30 " " —¾ " " "
21 " " —½ " " "

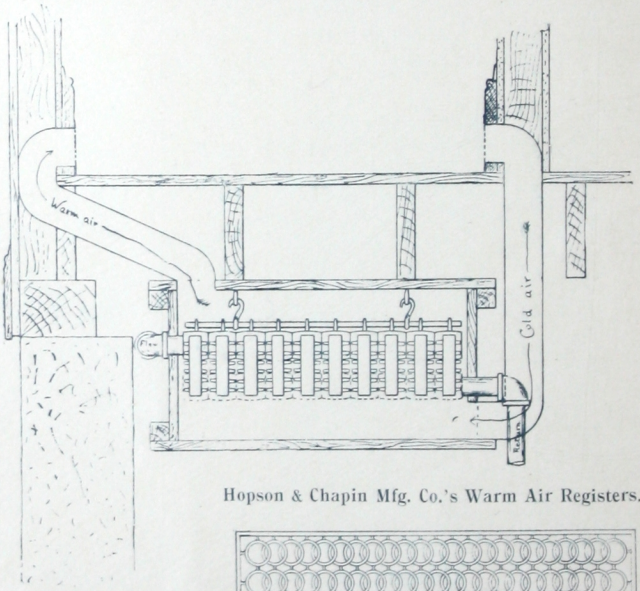
Dimensions Common to all Heights.			38 inches High.		30 inches High.		21 inches High.	
Number of Sections.	Length.	Width.	Square Feet Heating Surface.	Tapped.	Square Feet Heating Surface.	Tapped.	Square Feet Heating Surface.	Tapped.
2	6	8½	12	1 inch	9	1 inch	6	1 inch
3	9	8½	18	1 "	13½	1 "	9	1 "
4	12	8½	24	1 "	18	1 "	12	1 "
5	15	8½	30	1 "	22½	1 "	15	1 "
6	18	8½	36	1 "	27	1 "	18	1 "
7	21	8½	42	1 "	31½	1 "	21	1 "
8	24	8½	48	1 "	36	1 "	24	1 "
9	27	8½	54	1¼ "	40½	1 "	27	1 "
10	30	8½	60	1¼ "	45	1¼ "	30	1 "
11	33	8½	66	1¼ "	49½	1¼ "	33	1 "
12	36	8½	72	1¼ "	54	1¼ "	36	1¼ "
13	39	8½	78	1¼ "	58½	1¼ "	39	1¼ "
14	42	8½	84	1¼ "	63	1¼ "	42	1¼ "
15	45	8½	90	1¼ "	67½	1¼ "	45	1¼ "
16	48	8½	96	1¼ "	72	1¼ "	48	1¼ "
17	51	8½	102	1½ "	76½	1¼ "	51	1¼ "
18	54	8½	108	1½ "	81	1¼ "	54	1¼ "
19	57	8½	114	1½ "	85½	1¼ "	57	1¼ "
20	60	8½	120	1½ "	90	1¼ "	60	1¼ "

Centers for connections 4 inches above floor.



Pin Indirect Radiator.





Hopson & Chapin Mfg. Co.'s Warm Air Registers.

Sizes Openings, 4 x 24, 4 x 30, 4 x 36.
Sizes over all, 4¾ x 24¾, 4¾ x 30¾, 4¾ x 36¾.

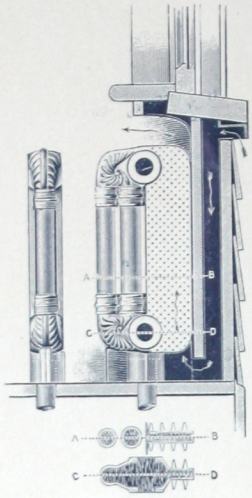
VENTILATING (INDIRECT) RADIATORS.

AN APPARATUS for warming and circulating air for the purpose of warming and ventilating buildings, or for warming only.

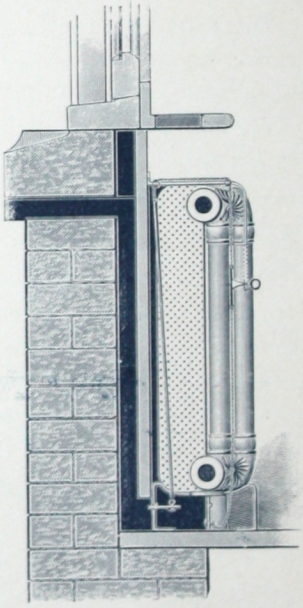
The radiators built and used by this company for this purpose are of the style known as the pin cast iron indirect radiators and are joined together with screwed iron nipples As shown in cuts these joints are made up in diagonally opposite corners and are through connections from one end of the radiator to the other—the upper one for flow connection and distribution and the lower one for return.

The "indirect" radiator is intended for suspension from floor beams in cellar and may be used for warming only, as illustrated. The air of a room is led to the radiator and the warm air is conducted from it by suitably arranged ducts covered by registers in the room and therefore performing the work of a "direct" radiator less the radiation. By this means the space occupied by a "direct" radiator and its presence in the room is avoided.

To secure a fresh air supply the cold air connection is made to take air from out of doors, and this air, warmed by the radiator, is led to the room to be warmed and ventilated by a duct covered with a register. In this case the air circulation within the room is secured by exhaust of air from the floor into a chimney flue or specially arranged exhaust duct heated by pipes to cause positive exhaust in such volume as the requirements of the apartment demand.



21 Inches High. Frame.



30 Inches High.

COMPOUND RADIATORS.

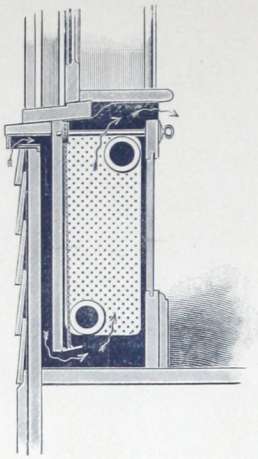
COMPOUND RADIATORS.

THE MOST efficient location in any room for a direct radiator or an indirect register is underneath the window or windows having the coldest exposure. The Compound Radiator is built for this location. Its front part is a direct radiator. The rear part, separated by a partition, takes air from under the window sill and discharges it warmed through an opening under the window or through a register in the window seat.

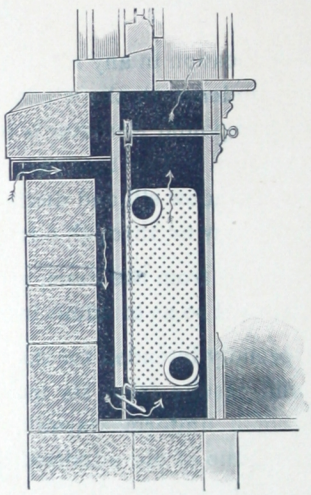
A damper, under control from the room, graduates the admission of outside air, or may be turned so as to admit inside air only.

This radiator is especially intended for the warming and ventilating of school buildings, and results from its use are highly satisfactory, particularly in respect of a uniform warmth, protection against cold windows and corners, volume of air admitted at less than a perceptible current, and economy of fuel and attendance.

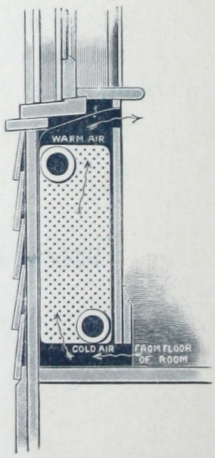
Width of Radiator over all, 9 inches; width of Indirect part, 4½ inches.



Frame, Outside Air.



Brick, Outside Air.



Frame, Inside Air.

THE "D" VENTILATING RADIATORS.

THE "D" VENTILATING RADIATORS

ARE INTENDED to accomplish the finest scientific and practical results in warming and ventilation, or either, in buildings where the best work is desired.

The air of the apartment or fresh air from out of doors is warmed and admitted under the window—a place not accessible by other means, except on floors under which indirect radiators may be suspended.

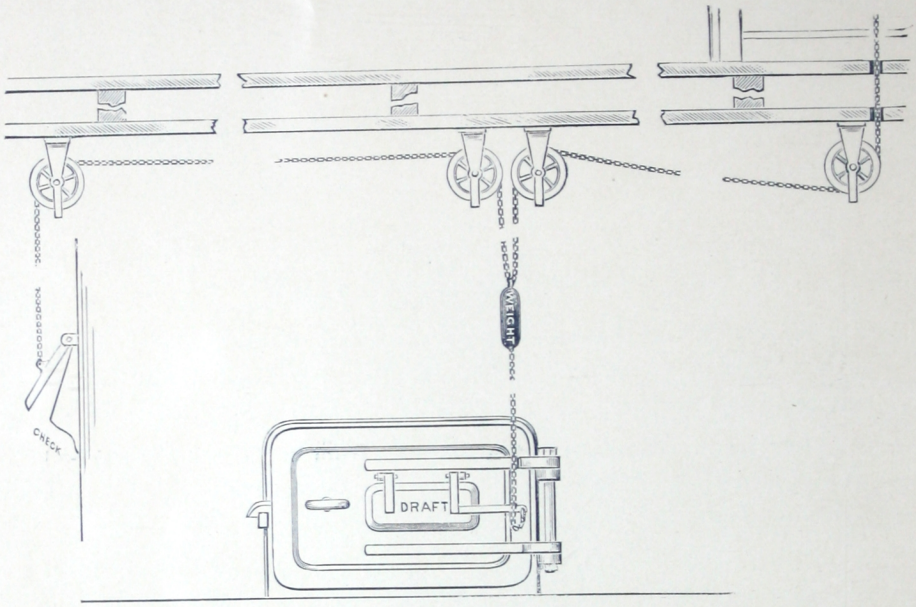
These radiators occupy no space in the room. Panels or other finish conceal the radiator, not even a register being in view.

Depth required, 7 inches.

Hot Water Thermometer.
Price, $5.00.

Altitude Gauge.
Price, $5.00.

Hand Damper Regulator.
Price, $5.00.



HOPSON & CHAPIN MFG. CO.'S HOT WATER EXPANSION TANK.

Open to Atmosphere.

A cast iron tank, durable as any part of the apparatus, fitted for ½ inch ball cock with 5 inch ball for automatic feed, tapped for expansion pipe, overflow and glass gauge.

Price List.

Number.	Contents in Gallons. With Ball Cock in.	Contents in Gallons. Without Ball Cock.	Width.	Depth.	Height.	Price.
4	4	7	21 In.	8½ In.	13 In.	$ 9.00
6	6	9	21 "	8½ "	16 "	10.00
8	8	11	21 "	8½ "	19 "	11.00
10	10	13	21 "	8½ "	22 "	12.00
12	12	15	21 "	8½ "	25 "	13.00
15	15	18	21 "	8½ "	29 "	16.50

The ears with ½ inch lag screw holes are set 16 inch centers.
Brackets and Shelf to support are not needed.
Prices given above do not include Ball Cock or Glass Gauge.
One-half inch Ball Cock with 5 inch Ball.....$2.00.
Glass Gauge, Nickel Plated..... 2.50.

THE FOREGOING illustrations and descriptions exhibit apparatus for warming, and warming and ventilating.

The most important question connected with the subject is their proper installation in any premises.

Allusion has been made in preceding pages to the importance of a carefully and intelligently estimated layout and a proper plan of erection.

After an active experience of several years in the warming and ventilation of every variety of buildings, we are quite prepared to say that the plan under which any heating apparatus is erected is of the first importance, and all other questions connected therewith should follow it.

We know very well the reverse method of arriving at a decision is frequently taken. The subject is often approached in the view that some heating apparatus as it is manufactured constitutes a machine, measured in feet or gallons, that is of itself competent or not to satisfactorily warm a given premises.

A boiler is often held to be pre-eminently fit to receive the praise or blame of the entire plant, including the merit in the use of water to carry heat. It must be plain, however, to any one on reflection that a farmer's kettle, enclosed, will warm any premises if it is large enough, and that the best planned boiler specially built for hot-water heating will fail to do so if the other links of the chain fail.

Now, there are points of great importance to govern the selection of a boiler. They are :

Efficiency per pound of fuel consumed.

Labor and skill required to maintain a desired temperature.

Facility for cleaning, and durability of joints and parts.

These points constitute a large field for selection, and a close examination of constructions and records of years' use would disclose a wide variety of results.

The point we wish to make is that the legitimate ground for choice in boilers is limited to nearly the above points.

In the matter of radiators, the heat units by the different constructions, especially under different locations, is a question that receives less attention than it deserves. Care is taken over the sizes of radiators, but little given to their location. It is our experience that within certain limits the latter question is more important than the former.

Again, short rules intended to promote quick sales are in common use. The process is to divide cubic contents by a factor.

The loss of heat from a warmed apartment to surrounding air of a lower temperature is through three exits, viz. : through glass, outside walls and by escaping warmed air. The loss of heat through glass can be accurately determined ; that through walls may be determined with sufficient accuracy, but the quantity of air lost from any apartment cannot be accurately measured. It may be approximated by experience under similar conditions.

The construction of buildings, their location and uses, the desires and needs of the occupants, the values of heating surfaces in boilers, and of radiating and air-heating surfaces in radiators, vary so greatly that no fixed rule for allotment is safe.

The fact of the business is that a plan for the installation of a fit hot-water plant competent as to the allotment of capacities, suitably proportioned in its parts and able to accomplish the intended results is a work of engineering computation, skill and experience, not of commercial push alone.

In this connection it must be borne in mind that an intelligent equipment of hot water heating apparatus may not be limited to the mere production of heat.

Stoves, steam and furnaces produce heat, and in great abundance. If heat alone were the object sought but little thought need be given to plans. Modern cultivation has progressed beyond the mere desire to be warm. The apartment should be uniformly warmed at every point, not merely in the center or on warm walls, but on floors and about cold windows. The several rooms of a building should be uniformly temperate and the plant yield desired warmth without frequent regulation or attendance, but be governed according to out of doors temperature by the fire. The intent of the apparatus is to sustain heat. The quantity of fuel in combustion, the rate of combustion, the temperature of water in use, its uniform delivery at different points and at various levels in the building to accomplish a uniform or uniformly graded result are features to be realized.

In ventilation a sufficient quantity of air of an agreeable initial as well as resultant temperature, free from impurities, its point of entry, the exit of vitiated air, the velocity of both currents—that of the incoming air at a rate less than a perceptible current and of the outgoing air at a velocity sufficient to insure both the heat and ventilation desired—are, or may be, demands of modern intelligence.

Now, to answer inquiries with which we may be favored concerning the suitable or preferred sizes or styles of boilers and radiators for any premises, which inquiry involves necessarily the important points of a plan under which the apparatus could be erected, we inclose herewith an inquiry blank for information needed to make plans, and correspondence to this end will be entertained with pleasure.

THE HOPSON & CHAPIN MFG. COMPANY.

New London, Conn.,
May, 1893.

TABLE OF TEMPERATURE.

Compiled from observations of the Signal Service, U. S. A., and Blodgett's Climatology of the United States.

NOTE.—In the United States the comfortable temperature of the air in occupied rooms is generally 70 degrees, when walls have the same temperature.

STATION.	No. of mos. fire is required.	Mean temp. of fire mos.	Ave. No. of degrees temp. to be raised.	Max. No. degrees temp. to be raised.	Min. tem. of fire mos.
Albany, N. Y.	7	35	35	87	17
Baltimore, Md.	6	39	31	72	2
Boston, Mass.	7	37	33	81	11
Buffalo, N. Y.	8	35	35	83	13
Burlington, Vt.	7	32	38	90	20
Chicago, Ill.	7	35	35	90	20
Charleston, S. C.	3	52	18	47	23
Cincinnati, O.	7	42	28	77	7
Cleveland, O.	7	38	32	83	13
Detroit, Mich.	7	35	35	90	20
Duluth, Minn.	8	28	42	108	38
Indianapolis, Ind.	7	41	29	88	18
Key West, Fla.	0	0	0	26	44
Leavenworth, Kan.	6	37	33	90	20
Louisville, Ky.	6	42	28	80	10
Memphis, Tenn.	5	39	31	68	2
Milwaukee, Wis.	8	37	33	95	25
New Orleans, La.	0	0	0	44	26
New York, N. Y.	7	40	30	76	6
Philadelphia, Pa.	7	40	30	75	5
Pittsburg, Pa.	7	39	31	82	12
Portland, Me.	8	33	37	82	12
Portland, Or.	6	43	27	67	3
San Francisco, Cal.	4	53	17	34	36
St. Louis, Mo.	5	37	33	86	16
St. Paul, Minn.	7	25	45	102	32
Washington, D. C.	5	40	30	73	3
Wilmington, N. C.	4	50	20	55	15

USEFUL NOTES.

EXPANSION OF WROUGHT IRON PIPE—1 at 32° = 1.00122 at 212°

EXPANSION OF WATER—1 Volume at 40° = 1.04 at 212°

EXPANSION OF AIR—1 Volume at 32° = 1.

1 Volume at 0° = .935

1 Volume at 72° = 1.083

PERCEPTIBLE CURRENT OF AIR = 1½ to 2 ft. per Second.

ORDINARY VELOCITY OF AIR IN DUCTS OR ASPIRATING SHAFTS = 3 to 8 ft. per Sec.

HEAT UNITS NECESSARY TO RAISE 1 CU. FOOT AIR 70° = 1.44

HEAT UNITS LOST PER SQ. FOOT—8 inch Brick Wall 0°-70° = 15.61

12 " " " 0°-70° = 13.16

Glass.....0°-70° = 38.01

79 HHIC

TABLE OF SOME DIMENSIONS WROUGHT IRON PIPE.

Size of Pipe	Internal Area.	Length of Pipe per square ft. of outside surface.	Parts of Gallon for one Lineal foot.	Size to Drill for Thread.	Length to Thread.	Number of Threads.	Price per foot.
½	0.3048	4.502	.0158	23-32	½	14	.6
¾	0.5333	3.637	.0276	15-16	9-16	14	.7½
1	0.8627	2.903	.0448	1 3-16	⅝	11½	.10½
1¼	1.496	2.301	.0777	1 15-32	11-16	11½	.14
1½	2.038	2.01	.1058	1 23-32	13-16	11½	.24
2	3.355	1.611	.1743	2 3-16	⅞	11½	.33
2½	4.783	1.328	.2484	2⅝	1	8	.50
3	7.388	1.091	.3405	3¼	1	8	.62
3½	9.887	.955	.5136	3¾	1 1-16	8	.74
4	12.730	.849	.6613	4¼	1⅛	8	.88
4½	15.939	.765	.828	4¾	1¼	8	1.06
5	19.999	.629	1.0038	5 5-16	1¼	8	1.28
6	28.889	.577	1.0678	6 5-16	1⅜	8	1.65
7	38.737	.505	2.0123	7⅜	1½	8	2.10
8	50.039	.444	2.5998	8⅜	1⅝	8	2.75
9	63.633	.394	3.3055	9 19-32	1⅝	8	3.75
10	78.838	.355	4.0955	10 13-16	1¾	8	4.75

TABLE OF AREA OF CIRCLES.

Diameter.	Area.	Diameter.	Area.	Diameter.	Area.
1	.7854	11	95.0332	21	346.3606
2	3.1416	12	113.0973	22	380.1327
3	7.0686	13	132.7323	23	415.4756
4	12.5664	14	153.9380	24	452.3893
5	19.6350	15	176.7146	25	490.8739
6	28.2743	16	201.0619	26	530.9292
7	38.4846	17	226.9801	27	572.5552
8	50.2655	18	254.4690	28	615.7522
9	63.6173	19	283.5287	29	660.5199
10	78.5398	20	314.1593	30	706.8583

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